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USSR Report

CYBERNETICS, COMPUTERS AND AUTOMATION TECHNOLOGY

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USSR REPORT

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HARDWARE

PERSONAL COMPUTERS ON THE STARTING LINE

Moscow IZVESTIYA in Russian 11 Jul 86 p 3

[Article by Academician B. Naumov, director of the Informatics Problems Institute of the USSR Academy of Sciences, under the rubric: "New Technology: From Idea to Series"]

[Text] Much has been written about the personal computer (PEVM) in the last several years, as a result of which the question "What is it and what is it for" has become quite involved. Thus a good place to start is how they should be used.

The PEVM ("personal electronic calculating machine (EVM)", "professional EVM", "personal computer") makes it possible to increase labor productivity by 3-5 times in practically any area of intellectual activity. And any individual can accomplish this who is employed in science, production, management, service, or education- from the school child to the minister- since it is intended to be used by the individual. This is what makes the PEVM fundamentally new.

Despite the simplicity of operating the PEVM, one must become accustomed to intercourse with it. Thus the extensive, early (beginning in elementary school) introduction of the PEVM into the educational systems is of the highest importance. It is not accidental that nearly half of the planned PEVM output for the five-year plan will be used in educational institutions.

Although the PEVM is a personal tool, its greatest effectiveness lies in mass application: All designers of design bureaus and all institutional office workers should be furnished with them. The PEVM must without fail be utilized throughout the entire technological work cycle. Increasing the labor productivity of only isolated staff members (those who first received personal computers) has no affect on the productivity of the entire collective. All of the capabilities of computer data processing at each work place are realized only when the PEVM is tied to data banks, or data storage centers. This is why each personal computer must be connected with the institution's central computer.

The collective nature of the work accomplished in all institutions (coordination of work into a single cycle) also requires the interconnection of all the PEVM of an institution. Such a local-area network can transmit to all staff members of the organization the most diverse information- from official correspondence to sketches, the results of calculations, etc. In many cases PEVM can be produced as ready network complexes that are oriented to various collective users.

In the very near future the nation will assume the mass production of PEVM- the production of 1.1 million units is planned for the five-year plan.

A task such as this can not be solved by the efforts of any one ministry. Specialization of various enterprises of many sectors in the production of the individual types of personal computer components and thus their close cooperation are needed. In order to assure the unity of the scientific and technical management of the entire task of creating, developing and standardizing PEVM and thus assuring the feasibility of their mass production, the "Personal EVM" intersectorial scientific and technical complex (MNTK) (whose head organization is the Informatics Problems Institute of the USSR Academy of Sciences) was created in December 1985.

The tasks given to this complex are quite complex, and are made more so since all of the work is being accomplished simultaneously with the establishment and organization of the MNTK itself. There isn't time to get things going since the first machines will be produced this year.

Unfortunately, however, there have long existed some very tall interdepartmental barriers in the area of computer science.

In our nation PEVM are being developed and produced by four ministries. More than 30 ministries produce components and materials for them. And there exist two international programs of the Council for Mutual Economic Assistance nations for the creation of computer facilities. PEVM are being developed in both programs.

Each developer here is making "his own" machine. As a result, several types of PEVM are being produced (or are being readied for production), where the majority of them differ only in structure and name. The same situation exists in the software development for these PEVM. Thus, the dissipation of the already inadequate designer personnel occurs instead of their unification, only because different ministries are conducting their own development. Furthermore, the consumers of the PEVM are misinformed- as a rule they are not aware of the equivalence of machines and programs that appear different (by name) to them.

Organizational troubles of this kind inhibit the solution of the mass automation task and the acceleration of scientific and technical progress. This is why the work of the "Personal EVM" MNTK is acquiring foremost importance.

The MNTK must work in close contact with industry, and, in addition, "go one step ahead" by determining the future directions for PEVM development. This is only possible if the MNTK conducts both basic and applied research, and makes experimental-design developments, i.e., only if it becomes a powerful company.

We are now establishing a collaboration with a number of ministries. However, its development is still impeded by departmental psychology. In order to break this psychology, we need the help of party and state organs. The departments are obligated to realize that the MNTK is not a temporary campaign, and that our problems must be solved and not left hanging.

The problem of the actual allocation of the resources required for the development of the MNTK is an acute one. We have been forced on numerous occasions to sharply raise these questions. But they have yet to receive a favorable solution.

The Moscow Party organization has given us great help, and we also feel the support of a new committee on computer science and informatics. However, the State Science and Technology Committee, several departments of the Gosplan USSR, the ministries that furnish the MNTK with the necessary resources and those that see to it that the complex has a real effect on the work of the appropriate enterprises still see in it just another instance of attempted coordination and reconciliation.

We have prepared plans for state-level solutions that are required to assure the effective operation of the MNTK, but they are tied up in the red tape of bureaucratic agreements at various levels, and in the six months that have elapsed since the MNTK was formed, this "cart" has not budged. It is much simpler for the bureaucrat to deny by alluding to existing provisions and instructions than to actually make a decision. The fact that the MNTK organization is raising complex questions makes it all the more difficult. As a result, all of the MNTK resources are allocated by the Academy of Sciences only- the ministries are standing to the side. But the Academy's resources are very limited.

The number of personnel (especially around Moscow), funds, etc.- all of this is primarily allocated by industrial ministries. Thus the main institute of the MNTK is presently housed at 17 (!) quite widely separated locations of the city (and in unpractical quarters). The MNTK has not yet been given experimental-design and technological facilities.

Despite these organizational difficulties, to which are added the natural problems of growth, we are solving without delay the primary tasks involved in creating domestic PEVM. Together with the Ministry of the Electronics Industry we have developed a PEVM for schools; the software for practically all domestic personal EVM is being developed together with the Electronics Industry, Radio Industry, Communications Industry and the Instrument Building Ministries, and the principle PEVM systems standards have been prepared; together with the organizations of these ministries and the academies of sciences of socialist nations, a development program for a new generation PEVM has been prepared within the framework of the high-priority "Elektronizatsiya" ("Electronization") direction.

However, the organizational obstacles that I was speaking about are hindering our work, while the rates of acceleration of scientific and technical progress specified in the decisions of the party and government require a transition in the briefest periods from the industrial production of thousands of machines per year to the production of hundreds of thousands, and of millions of PEVM in the near future. This requires a fundamental reorganization of specialist training, the development of new manufacturing processes and equipment, and the alteration of a number of standard design solutions.

In addition to assuring mass production on this scale, another requirement of the PEVM, and one of the most important- operating reliability, must be solved. This is clear: It is impossible for an engineer-serviceman to sit near each machine or to wait for a repairman to arrive from a service center. The personal computer is an everyday work tool, like the fountain pen or drawing board. And the reliability of the PEVM must exceed that of previously produced machines by 10-20 times. This also requires new solutions, both in planning and in production organization. Low reliability of domestically produced computers will inflict not only economic damage, but incalculable psychological damage as well- the confidence of many people in the feasibility of utilizing computer facilities will be undermined for years to come.

In order to facilitate the mass assimilation of computers into the everyday labor of workers of all categories, it is necessary to now begin an investigation of this process in its various aspects- economic, social and psychological. It is completely possible that the results of this work will introduce changes into the technical solutions of the PEVM and their applications software.

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MEETING OF ESTONIAN ACADEMY OF SCIENCES DESCRIBED

Tallinn SOVETSKAYA ESTONIYA in Russian 25 Jun 86 p 1

[Article by Estonian Telegraph Agency: "A Decisive Turn"]

[Text] The rapid pace of economic renewal requires the decisive turn of science to the inquiries of practice, the continuous fortification of the arsenal of scientific ideas and developments, and the perfection of the mechanism by which they are implemented- such was the subject of discussion by participants of a general meeting of the EsSSR Academy of Sciences which occurred 24 Jun in the republic capitol.

Associate member of the USSR Academy of Sciences, president of the EsSSR Academy of Sciences, Hero of Socialist Labor K. Rebane presented the speech "Tasks of the EsSSR Academy of Sciences in carrying out the decisions of the 27th CPSU Congress." He emphasized that much of the work of Estonian scientists was at the leading frontier of Soviet science. Basic research in solid state physics, nonlinear optics, nuclear magnetic resonance, informatics and computer science, biotechnology, thin-layer chemical synthesis, etc., has yielded good results. The institutions of the EsSSR Academy of Sciences are actively participating in the execution of more than 20 all-union science and technical programs. The Academy of Sciences heads 10 similar republic academies, including such essential ones as "Scientific Instrument Engineering", which is called upon to solve a number of problems of modern industrial technology and technology of other fields.

The basic research of the academic institutes has made it possible to introduce some very concrete developments in the economy. These include the "UKhAA-85" microcomputer complex, the "Yuku" scholastic computer and the experimental production from local raw materials of scarce agarose, the new "Ester-3" high-quality silage preservative and shampoo from waste fat from the fish-canning industry. One can also name an improved oil shale processing technology with the "Kiviter" gas generator, the technology to produce high-quality phosphorite concentrate which has been introduced at the Maarduk phosphorite deposit, and many others.

At the same time, the role of the Academy of Sciences in solving fundamental problems of increasing the efficiency of the republic's economy is still inadequate. Organizational forms and the system for assimilating the results of scientific research require improvement and the development of ties and colaboration between industrial and VUZ science. Construction of new scientific institutions is inadequate. The role of the Academy as a coordinator of scientific research in the republic must be increased in the forthcoming five-year plan. Basic research that creates the basis for new ideas and developments must be given priority here. The speaker noted that more initiative, constructive activity, exactingness with oneself and responsibility for the level of science comprises the principle conclusion to be made by all of us from the decisions of the ongress.

At the meeting president of the EsSSR Academy of Sciences K. Rebane presented a group of scientists with diplomas confering the academic degree of doctor of sciences, certificates confering the academic rank of professor and medals of the USSR Federation of Cosmonautics.

Elections were held for new members and associate members of the EsSSR Academy of Sciences. The academicians of the EsSSR Academy of Sciences elected Ya. Eynasto (astrophysics), E. Parmasto (botany) and M. Bronshteyn (agricultural economics). P. Saari (physics), G. Vaynikko (mathematics), V. Kul'bakh (mechanics), Yu. Yaksoo (informatics) and A. Koop (history) were selected as associate members.

A. Aben, chief of the science and educational institution section of the CC CP of Estonia, and V. Rayangu, minister of higher and secondary special education of the EsSSR participated in the work of the general conference of the EsSSR Academy of Sciences.

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ESTIMATING PRODUCTIVITY OF MULTIPROCESSOR COMPUTER SYSTEMS WITH CONFLICTS IN SHARED BLOCK STRUCTURE MEMORY

Riga AVTOMATIKA I VYCHISLITELNAYA TEKHNIKA in Russian No 2, Feb 86 (manuscript received 17 Apr 85) pp 74-80

[Article by V.F. Zeltinsh, L.P. Lobanov, V.A. Terskov and G.S. Timofeyev]

[Abstract] A method is suggested for estimating the productivity of multiprocessor computer systems consisting of an arbitrary number of identical processes and blocks of shared memory. The system studied consists of M identical processors and M blocks of memory. The organization of the system allows connection of any shared memory module to any processor. The functioning of the system is represented as a closed queuing system with waiting and random distribution of requests for all blocks of shared memory with no interaction among requests. It is assumed that the total flow of requests for servicing follows the poisson distribution, and that the waiting time for each memory block is exponentially distributed. The results obtained allow investigation of the variation in productivity as a function of the number of processors and memory blocks, and can be used in the development of methods for selecting efficient multiprocessor computer system structures to provide certain levels of productivity. Figures 5, references 11: Russian.

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CSO: 1863/361

UDC: 621.391:681.3.01

IMAGE RESTORATION IN ITERATIVE OPTICAL-ELECTRONIC SYSTEM WITH FEEDBACK

Novosibirsk AVTOMETRIYA in Russian No 2, Feb 86 (manuscript received 27 Aug 85) pp 63-69

[Article by O.A. Afanasyev, S.M. Borzov, I.S. Gidin, V.P. Kotenko, I.I. Razumova, V.N. Kudik, L.F. Chernyshev, A.I. Chernyshov and P.N. Sheiko, Novosibirsk]

[Abstract] The purpose of this work was development and creation of an experimental model of an interactive hybrid optical-electronic system with

optical feedback for the purpose of restoring images by an iterative method in quasi-real time. A structural diagram of the system is presented and its operation is explained. The maximum input frame dimensions are 50 x 50 mm^2, image size 512 x 512 elements, interactive mode, throughput about 5 TV frames per iteration. The device is controlled by an SM-4 computer system. Experimental studies confirm the effectiveness of the system for restoration of images and demonstrate that not over 10 iterations are required to restore blurred images. An example of a restored frame is presented, showing the original and three iterations of restoration. Figures 4, references 12: 7 Russian, 5 Western.

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UDC: 621.373.826

STUDY OF SENSITIVITY OF THERMOGRAPHIC MATERIALS BASED ON COPPER HYPOPHOSPHITE IN THE PROCESS OF THERMAL LASER RECORDING OF INFORMATION

Novosibirsk AVTOMETRIYA in Russian No 2, Feb 86 (manuscript received 17 Oct 85) pp 49-53

[Article by S.G. Bayev, V.P. Bessmeltsev, V.V. Boldyrev, O.I. Lomovskiy and A.Ya. Lushnikov, Novosibirsk]

[Abstract] A study was performed to determine the sensitivity of materials which can be used as the substrate for recording by means of the reaction of decomposition of salts of copper, as well as the possibility of changing the sensitivity of such materials. The major heat sensitive components in the materials studied were copper hypophosphite and its complexes. The correlation between sensitivity and instability constant of the copper complex in a solution was studied, as was the change in sensitivity resulting from the presence of special adsorber additives with high adsorption at the radiation wave length used. The materials were studied on paper and polyethylene terephthalate substrates with various complex formers. The sensitivity of the thermographic materials was measured on an automated installation used to study thermal laser recording processes, based on a laser readout device. The study was demonstrated the possibility of using materials in which recording is based on the chemical reaction of decomposition of copper salts in a light field for thermal laser recording of information. The relationship between threshold recording of energy and instability constant of the complex compounds in solution was established, allowing prediction of the sensitivity of materials containing various copper complexes. Most of the radiation energy during recording is scattered in the substrate material. The addition of adsorbers was found to decrease threshold recording energy significantly, allowing the sensitivity of the materials studied to be varied within the range of 0.2 to 1.6 J/cm^2. Figures 4, references 9: Russian.

6508/9835
CSO: 1863/357

UDC: 535.211

REAL TIME RECORDING OF REFRACTION HALF TONE TRANSPARENCIES ON POLYMER FILMS

Novosibirsk AVTOMETRIYA in Russian No 2, Feb 86 (manuscript received 20 Jul 85) pp 59-63

[Article by S.G. Bayev and V.P. Bessmeltsev, Novosibirsk]

[Abstract] A study was made of the method of recording raster lens half tone transparencies, restoring the image by projection in ordinary transparency projectors and microfiche readers. The recording process is a single-stage process, requiring no subsequent development, based on the thermal interaction of laser radiation with films of transparent organic materials. The 10W continuous CO_2 laser was focussed onto the surface of the recording materials in a 150 μm diameter spot and modulated as to time of radiation on a single spot within the 10-100 μs range. Microscopic lenses 10 to 50 μm in diameter were thus formed in the material. Reading of the material was based on scattering of the light by the microscopic lenses and filtration of the scattered light in the aperture of the projection lens. The experiments demonstrated the possibility of recording both monochrome and color half tone images with resolutions of up to 80 lines per millimeter for use in ordinary projectors. The resolution and contrast characteristics are 2 to 5 times poorer than the characteristics of silver halide microfilm materials, but could be significantly improved by decreasing laser beam focus spot diameter. Advantages of the new method include low cost and the lack of a development phase and of light absorption in the transparency. This makes the method suitable for high intensity projection onto large screens. Figures 5, references 8: 6 Russian, 2 Western.

6508/9835
CSO: 1863/357

UDC: 681.3

FEATURES OF DESIGNING SOFTWARE OF MULTIFUNCTIONAL SYSTEM FOR MODELLING PROGRAMMABLE MICROPROCESSOR STRUCTURES

Riga AVTOMATIKA I VYCHISLITELNAYA TEKHNIKA in Russian No 2, Feb 86 (manuscript received 30 Jul 84 {10 Apr 84}) pp 81-92

[Article by V.A. Kuzub and B.N. Rozenblyum]

[Abstract] This work studies problems of design and organization of the software for a simple and inexpensive system for debugging of microprocessor devices, which provides extensive functional capabilities to the system, including debugging of multi-microprocessor structures. The system includes a microcomputer with I/O devices, a debugging process control panel, the microprocessor device being designed or a portion of such a device, and an interface to interconnect the individual elements of the system. The central problem of constructing the software for the suggested debugging system is that of organizing information interchange. A memory-map I/O system is assumed, allowing information interchange between program modules and between program and user to be performed in the same manner. Time relationships in the microprocessor structures are modelled in the system by an asynchronous method, with a "modelling cycle" used to represent a unit of model time. The method of consideration of time delays is discussed. A control program coordinates and sequences the operation of software programs during modelling and debugging of microprocessor devices. The methods suggested were used to develop the software for a debugging system which runs on an "Elektronika S5-02" microcomputer. References 7: Russian.

6508/9835
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UDC: 681.3:068

DESIGN PRINCIPLES FOR MACHINE-INDEPENDENT LINKAGE EDITORS AND LOADERS IN MICROCOMPUTER CROSS COMPILERS

Moscow PROGRAMMIROVANIYE in Russian No 2, Mar-Apr 86
(manuscript received 2 Apr 85) pp 58-63

[Article by A.A. Levitskiy and M.M. Muchnik]

[Abstract] Methods of design of machine-independent and parametrically adjustable components are of great interest, allowing as they do significant reductions in labor consumption for the development of cross-compilers for new microcomputers. This article suggests methods for constructing linkage editors and loaders to assure machine independence while preserving the traditional functions of other components of cross compiler systems. Requirements for linkage editors and loaders are outlined, the structure of the linkage editor and loader subsystem of a cross compiler system is discussed, and the structure of object modules and load modules is described. The principles for design of machine independent linkage editors and loaders analyzed in this article allow these programs to be used for a broad range of microcomputers. The first version of a machine-independent linkage editor was included in the MAYAK-YeS system in 1980. The linkage editor and loader subsystem was then developed in the form described in this article in 1981-1982 and utilized in a cross-compiler for 4 microcomputers. References 5: 4 Russian, 1 Western.

6508/9835
CSO: 1863/360

UDC: 681.3.06

ORGANIZATION OF DIALOGUE LOAD OPERATION OF THE NORMIN INFORMATION SYSTEM WITH THE OB MULTITERMINAL SYSTEM

Moscow PROGRAMMIROVANIYE in Russian No 2, Mar-Apr 86
(manuscript received 3 May 85) pp 64-69

[Article by A.I. Kirov, Yu.D. Romanova, and G.V. Obideniy]

[Abstract] The NORMIN (normalized information) system is a full-text plus graphics information retrieval system based on the use of normalized natural language for input, internal processing and storage and output of information. This article describes the system of semantic search for text information used in NORMIN when controlled by the OB monitor, which allows multiterminal processing of information with shared storage devices. Normalization of language is performed in NORMIN by limiting the number of semantic links and precisely defining their meaning, by defining relatively

simple statement structures, and by fixing the composition and meaning of the descriptors used, eliminating synonyms and homonyms. A hierarchical code dictionary is provided with the system, a concrete semantic model of each subject area. Information is output to the user in the form requested by the user during the dialogue process. NORMIN-OB provides an effective, flexible, man-machine system allowing information retrieval based on natural language requests for a large number of users simultaneously. References 9: Russian.

6508/9835
CSO: 1863/360

UDC: 619.682

INTERACTION OF ASSEMBLER AND PL/1 PROGRAMS WITH OS YeS DATA CONTROL SYSTEM IN MULTITASKING MODE

Moscow PROGRAMMIROVANIYE in Russian No 2, Mar-Apr 86
(manuscript received 7 Aug 84) pp 87-91

[Article by S.A. Komarov]

[Abstract] A study is made of the specifics of interaction of programs written in assembler in the OS YeS multitasking data control system, written in PL/1, assuming that the programming system has a simple or overlay structure, and that the multitasking mode is created by a program written in PL/1. The file open and file control modules are studied, since it is these modules which form the connecting link between a PL/1 file and the OS YeS data control system. The various ways in which an assembler program can interact with the data control system in the multitasking mode initiated by PL/1 are noted. It is found that the major requirement for using the basic access facilities of assembler in a multitasking mode created by a PL/1 program is the presence of the required control blocks (DCLCB, FCB, DCB) describing the files. A second requirement is establishment of the multitasking environment for the assembler program in PL/1. References 3: Russian.

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AUTOMATION OF GENERATION OF PATHS FOR TESTING OF PROGRAMS WRITTEN IN FORTRAN

Moscow PROGRAMMIROVANIYE in Russian Mar-Apr 86 (manuscript received 7 Feb 85) pp 24-31

[Article by K.A. Iyudu and M.M. Aripov]

[Abstract] This work describes the APOS system which automatically generates the minimum number of paths fully covering a program graph, or structural model of a program, showing the relationships among its elements. The GRAF subroutine was written in PL/1 to produce such interconnection graphs of FORTRAN programs. The output of this subroutine is a program graph in packed matrix form. A new method is suggested for adjusting the program graph to acyclic form. A new method is also developed for constructing minimal coverage of the program graph. The system features automatic construction of the minimum number of paths completely covering the program graph. Representation of the graphs in packed matrix form allows relatively simple and rapid modelling of the process of movement over the graph for the construction of paths. The methods suggested for reducing the program graph to acyclic form and constructing the minimum coverage are more effective than existing methods. Figures 10, references 12: 3 Russian, 9 Western.

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TESTING OF PROGRAMS OF PARALLEL COMPUTER SYSTEMS WITH COMMON CONTROL

Moscow PROGRAMMIROVANIYE in Russian Mar-Apr 86 (manuscript received 5 Feb 85) pp 41-47

[Article by G.N. Kalyanov]

[Abstract] An attempt is made to determine certain structural properties of the flow of data through a program and, on the basis of these properties, a number of testing strategies are presented, oriented toward data streams. The strategies expand previous strategies developed by Laski and Korel to orient them toward parallel computer systems with common control. The expansion concerns models of data flows including a number of parameters characterizing the composition of processor elements at each point in the program, resulting in the appearance of additional testing paths corresponding to various methods of parallel processing of information entities. The strategies suggested include the following major features: they are oriented toward testing of individual program statements and are universal in the sense of applicability to any statement of practically any known higher level programming language; the strategies can be used to test modules or entire programs; and the strategies allow more complete testing of programs

than earlier strategies, based on analysis of the flow of control in a program, and allow detection of a number of errors related to the structure of the data flows. It is possible to detect both errors specific for programs in parallel computer systems and ordinary errors in the data flows of sequential programs. References 3: 2 Russian, 1 Western.

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TOOLS FOR DIALOGUE PROGRAM DEVELOPMENT

Moscow PROGRAMMIROVANIYE in Russian Mar-Apr 86
(manuscript received 19 Sep 84) pp 48-57

[Article by B. Volozh, M. Kakhro, A. Urvak and A. Shmundak]

[Abstract] Development of the DIMO dialogue monitor at the Institute of Cybernetics, Estonian Academy of Sciences, has allowed the creation of a system of tools to facilitate the development of dialogue application programs. This article discusses the development of dialogue application programs using DIMO in the following sequence: development of data structures to be used in the dialogue, planning of a dialogue scenario, development of application modules, creation and recording of scenarios in a library, and compilation of the application program. A figure illustrates the structure of an application program designed to operate with DIMO. The facilities provided by DIMO are briefly described. The DIMO system operates on YeS computers under OS YeS V 6.1 with local or remote YeS 7920 terminals, either independently or in a time-shared environment. It includes resources allowing adaptation of the system for development under control of remote processing monitors. The dialogue control program occupies 40-50 K, depending on the specific scenario. Figures 7, references 3: Russian.

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APPLICATIONS

ANALYSIS OF OPERATION OF VTs AND STATIONS USING STATISTICAL SIMULATION

Moscow VESTNIK STATISTIKI in Russian No 8, Aug 86 pp 36-39

[Article by Candidate of Economical Sciences Ye. Yevstigneyev, Leningrad Institute of Soviet Trade imeni F. Engels, under the "Mechanization of Statistical and Accounting Jobs" rubric]

[Text] Further expansion of the technical base of automated systems hinges upon application of new generations of computer complexes, based on universal microcomputers of the "Elektronika 60," YeS-1840 and other types.

In equipping computer centers (VTs) and stations with expensive computer facilities, it is necessary to meet requirements for their rational utilization and for cutting information processing costs. In addition, one should take into account qualitative parameters of computer network operation which most completely characterize the ability of a network to serve customers (subscribers). Thus, it is necessary to organize the process of computerized processing in such a way as to provide quality customer service, while minimizing expenditure of labor and financial resources of VTs. The specific character and complexity of this task can be explained by the need to take into account the probabilistic character of requirements for data processing and of the time for performing the processing on computers. Therefore, the process of computerized processing can be presented as a queueing system which can be analyzed with the help of statistical simulation methods.

A simulation model was constructed that represented the operation of departments of mechanized document processing (OMOD), which are part of the organizational structure of Leningrad retail trade ASU. It was necessary to compute the required number of electronic accounting machines (EBM) of the "Iskra-554" type, and to analyze the dynamics of various indices of the quality of customer service at given versions of organization of OMOD operation.

We shall examine an OMOD as a two-stage queueing system. The first stage, the document registration section, consists of one service channel, because one person performs all operations. Documents arrive at this stage one at a time or several pieces in a burst at a time. Time intervals between arrivals of requisitions (documents) and their number are random variables. Documents, arriving for processing, form an input flow with inherent elements of irregularity, both during a shift and at different days of a month. One can consider requisition holding time at the first stage to be approximately constant and specify it as one of the parameters of the system. After registration, each subsequent document is transmitted to a machine only in the regular order of arrival, i.e. no priorities for certain requisitions are set. The second stage, the machine processing section, consists of four channels (EBM) that operate in a parallel mode. A document that has been processed at the first stage is transmitted to any available machine, and if none is available, it "gets in a queue," the length of which is unlimited. Machines are used in the regular priority order, i.e. a channel cannot start processing until EBM that have finished service earlier are free. If a machine becomes available before a requisition arrived, an idle time period for this machine occurs. Requisition holding time is a random variable that depends on the type of a document, the number of lines etc. Requisitions that have not been processed by the end of a shift are considered not serviced and kind of "leave" the system.

In order to build a model, first the factors which exert a significant influence on the parameters of the system were theoretically substantiated and collected, and a sample observation was made which took four days to organize. The results were processed and described in terms of empirical distributions in a tabular form, because it had not been possible to derive an appropriate analytical expression for random variables of the model. Although the use of the theoretical distribution has a number of advantages, the use of empirical data made it possible to considerably simplify statistical processing of source data, which in addition represent the real operation of an OMOD over the entire range of values of the variables. Therefore, each table for three random variables (time intervals between arrivals of requisitions, the number of documents in a burst, holding time) included the following: the value of a variable (for instance, the number of documents in a burst: 1, 2, 3, ..., 12), the number of observed values, frequency, and cumulative frequency.

The following parameters that characterize the quality of OMOD operation were selected: the average waiting time for documents in a queue at both stages, the average EBM idle time, the average duration of stay of a document in the system; the number of documents not processed by the end of a shift, etc. During simulation of the process of computer processing of documents, the following were system parameters: requisition registration time at the first stage, the number of service channels (EBM), and maximum values set for service, waiting and idle time.

Simulation modeling was performed as follows.

Parameters were specified for the first version of organization of the process of document processing. We shall assume that the number of channels is 2 EBM, requisition registration time is 2 min, maximum service time is 60 min, maximum service waiting time at the second stage input is 30 min. These parameters, along with initial conditions and initial values of random variables, which were taken from tables of distribution of input and of processing time thereof, were entered into a computer.

Based on a simulation algorithm, the computer determined three random numbers, and in accordance with values of these numbers real values were sequentially chosen: requisition arrival time, the number of arriving documents and time for processing them. This was achieved by repetitive generation of random numbers and determining cumulative frequencies that corresponded to these numbers. Then, one derived the value of a variable from the cumulative frequency value. Then the computer determined 12 specified characteristics of system functioning including the most important ones, such as the number of documents not processed by the end of a shift, the average duration of requisition stay in the processing system, the total EBM idle time, the average length of the queue of documents at the input of the second stage, the number of requisitions whose processing time exceeded a specified limit, etc.

The goal of studying the first stage was to determine registration time for one requisition. Analysis has demonstrated that from the standpoint of technological capabilities of an operator who performs document control and registration, and of the dynamics of specified indices of the quality of functioning of the first stage, this time is approximately equal to 1 min. Therefore, analysis of the second stage and the system as a whole was performed under the assumption that the registration time model parameter was also equal to 1 min.

Simulation of the second stage was successively performed for one, two, three and four channels, i.e. the corresponding number of EBM. In this case, depending on the size of computer fleet, the following indices were determined: the average queue length, the average requisition waiting time before the start of service, the average service channel waiting time before the start of processing and the total idle channels (machines) idle time. The random character of documents arrival at an OMOD caused considerable equipment idle time in the case of three or four EBM (installed capacities were used at approximately 50%), but the length of requisition queues, waiting for the start of processing, became practically nothing in the case of four machines. Naturally, a decreased number of EBM led to a decrease in equipment idle-time ratio, but caused formation of a long queue of requisitions (documents). A compromise solution was achieved in the case of two machines: the average queue length was processing of approximately four documents, the average waiting time before the start of service was 18 min, the average machine waiting time before the start of processing was 2.5 min; the total idle time for two machines was 210 min.

These results do not make it possible yet to draw final conclusions as to how many machines one should use. One should take into account maximum values of the duration of requisition stay in the system and the number of documents not processed by the end of a shift. Therefore, additional analysis of indices of quality of system functioning at two stages of documents processing is needed.

Based on practical needs of customers, the time for processing requisitions for release of goods from warehouses should not exceed one hour, and the number of documents not processed by the end of a shift should not exceed two. These indices having been taken into account, the simulation has revealed the feasibility of using three EBM in the system, and not just two of them, as had been determined in the process of analyzing only the second stage. For three machines, the following parameters of the results of simulation of OMOD operation as a queueing system were obtained:

the number of documents, not processed by the end of a shift, - 1.7;

the number of documents, processing time for which exceeded one hour, - 0.3;

the average duration of document stay in the system - 14.7 min;

the average machine waiting time before the start of operation - 6.75 min;

the total idle-time for three machines - approximately 10 hours.

Thus, the use of simulation, based on a simulation model, made it possible to calculate various indices of quality of system functioning, and examine various versions of organization of OMOD operation. It should be noted that the required number of EBM, calculated without consideration for the random character of the process of documents processing as a ratio of the monthly volume of work to corresponding output of one machine, was two. But in practical operation of a computer unit processing of documents was performed on four machines; however, the simulation has demonstrated that three machines could have been optimally used. Indeed, the use of the fourth machine has improved the system's operation only negligibly (for instance, the average duration of document stay was reduced from 14.7 to 11.3 min, and the number of documents not processed by the end of a shift was reduced from 1.7 to 1.2).

As a result of the analysis of system's operation and elements, the structure and dynamics of various indices have been identified. In synthesizing the system with consideration given to results of the analysis, customers' requirements were formulated and methods for implementation were determined, i.e. the number of machines, required for a given maximum document processing time and permissible number of requisitions not serviced by the end of a shift.

Limitations of the above examined model are: the two-stage structure of the simulated system, the fixed order of passage of documents at the first stage, which is a one-channel stage at that, and the absence of simulation of machines' failure and repair time. At the same time, it is not difficult to introduce these factors as system parameters and variables and generalize the model for other situations encountered in mechanization and automation of accounting jobs. Therefore, statistical simulation of queueing systems can be used in development of collective use computer centers, data processing and transmission networks, and centralized service and repair of computer equipment facilities.

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SECOND STAGE OF STANDARD ASOD OF ADMINISTRATIVE DISTRICT

Moscow VESTNIK STATISTIKI in Russian No 8, Aug 86 pp 31-36

[Article by Candidate of Economic Sciences E. Vanags, Latvian branch of NII TsSU SSSR [Scientific Research Institute, USSR Central Statistical Administration], under the "Mechanization of Statistical and Accounting Jobs" rubric]

[Text] At the end of 1985, an interagency commission accepted for industrial operation the second stage of a standard automated data processing system (ASOD) of an administrative district (with the Valmiera district, Latvian SSR, as an example). In developing the system, the objective was to improve management of an administrative district, as well as of its enterprises and organizations. Besides, the ASOD should provide the republican level of ASPR [automated control system for planning calculations], ASGS [automated system for state statistics] and other ASU [automated management systems] with necessary data.

The organization-technical basis of the ASOD of an administrative region is the state statistics RIVTs [district information-computer center], equipped with a YeS EVM [unified system of electronic computers] computer, SM 1600 and peripheral equipment. It is envisioned that RIVTs with computers will not be organized in all administrative districts, but only in centers of economic regions covering several districts.

Unlike territorial ASU of other Union republics, which usually do not include ASU of enterprises and organizations located within a given territory, the ASOD in Latvia unifies all automated management systems operating within a district. This is the result of the fact that, except state statistics RIVTs, in administrative districts of the republic, as a rule, computer centers of other ministries and agencies are not being created, which means that there are favorable conditions for combining automated systems of all RIVTs users into a unified territorial automated system.

Automated data processing systems of district governing agencies and ASU of district enterprises and organizations are identified as functional subsystems of the ASOD. Customers of these functional subsystems are the Valmiera district executive committee, republican Ministries and agencies that have subordinate enterprises and organizations in the administrative district, and enterprises of union subordination. The developers are VTs [computer centers] of corresponding Ministries and agencies, and scientific-research and design organizations. The head customer of the system is the Latvian SSR TsSU [Central Statistical Administration], the head developer is the Latvian division of NII TsSU SSSR [Scientific Research Institute, USSR Central Statistical Administration]. They prepared a standard request for proposal, all-system contract and detail projects for development of the ASOD, and a procedure for development of contract-detail projects for solving problems. They also developed methodological foundations for the development of a system for integrated processing of accounting and statistical data, procedural materials on ASU interaction in an automated district system, and procedural instructions on determining economic efficiency of the ASOD. The entire general system documentation and procedural materials are used by developers of functional subsystems and serve as a means for combining ASOD of district governing agencies and ASU of district enterprises and organizations into a unified territorial automated system.

Taking into account the fact that the automated district system unifies all ASU in the district and that it functions on a unified information and hardware basis, the system is based on the following principles: maximum standardization of support and functional subsystems; cooperation and interaction, both during development and operation; clear separation of development of all-system and partial design solutions; formalization of development methods and widespread application of standard forms in formalizing partial detail projects; rational utilization of standard models and design solutions of other ASU; reasonable combination of centralized and decentralized data processing; stage-by-stage and continuous expansion.

If the first stage of the standard ASOD of the administrative district, put into industrial operation in the 10th Five-Year Plan, included 22 complexes of problems for local state statistics agencies, agricultural enterprises, the district association of Goskomsyelkhoztekhnika [State Committee of Agricultural Equipment] (it is now a part of Gosagroprom [State Agro-Industrial Committee]) and the district consumers' society, its second stage includes 16 subsystems with 113 complexes of problems (tasks).

During the 11th Five-Year Plan, the Valmiera RIVTs was expanding intensively. Its annual work volume was 1.3 million rubles. During the last Five-Year Plan, the volume increased by 85.4%, including an increase of computer jobs by a factor of 6.3.

The presence of a large-capacity VTs with highly skilled professional staff made it possible to implement the program of development of the second stage of the standard ASOD of the administrative district. It includes the following subsystems: the district level ASGS, automated management systems of agricultural production, district Goskomsyelkhoztekhnika association, a mobile mechanized column of the Latvian SSR Ministry of Land Reclamation and Water Resources, an integrated logging-lumbering enterprise, a meat packing plant, an ASOD of the district consumers' society (wholesale depot) and of the district division of the USSR Stroybank [Construction Bank], the automated system for processing of insurance transactions, ASU RIVTs, ASU "Vtorchermet"

[Trade for Ferrous Metallurgy], ABD [automated data bank] "Population", as well as complexes of problems for local governing agencies, etc.

A special spot within the ASOD framework belongs to the district level ASGS, which provides the necessary information to the district party committee and district executive committee, to the RAPO [not further identified], and to the other district organizations, as well as to the republican level of ASGS.

The development and expansion of the district ASGS is going in the following principal directions: transition from mechanized to automated processing of statistical reports, conducting experimental work on integrated processing of accounting and statistical data, automation of agricultural production data, using correlation and regression methods, and development of the regional ABD.

Experience demonstrates that in the case of automated processing, the volume of statistical data presented to the district governing agencies can be reduced considerably by separating the presented results information by management levels and concrete users, by using exception reporting, and by wider application of "Query-Answer" and "Dialog" modes.

Information-reference service for local governing agencies and other district management agencies changes significantly in the case of functioning of a regional ABD, which is the central data bank in the district ABD system.

The regional ABD includes aggregated retrospective data on the economic and social development of the entire district, as well as individal data on specific entities (agricultural and industrial enterprises, construction organizations, developers, automotive enterprises, towns, subordinate to the district, village Soviets, schools, preschool institutions, clubs, libraries etc.).

In the regional ABD database, the following sections are identified: population, industry, agriculture, transportation and communications, capital construction, labor and wages, trade and public nutrition, housing and public utilities, customer service, public education and culture, public health and social security, environmental protection and rational utilization of natural resources, finance, and information-computer service.

The set of indices included in the regional ABD, is determined based on dynamic series and information profiles of towns of district subordination that are maintained in local state statistics agencies, the district information profile, compiled by the district executive committee planning commission, the integrated plan of economic and social development of the district, proposals presented by Latvian SSR TsSU and the district executive committee, etc.

In forming the database, it is contemplated to use files which have been built up during the process of automated processing of statistical and accounting reports, and to interact with ABD "Population" and other district ABD and with centralized ABD at the republican level, that operate within the framework of interindustrial management complexes "Industry", "APK" [not further identified], "Capital Construction" etc. In the future, a regional ABD will operate as a distributed automated data bank.

Creation of a regional ABD provides the following: elimination of duplication in various management agencies and reduction of labor by eliminating statisticians, economists and others employed in the management sphere; reduction of outlays on acquisition, processing and storage of information on economic and social development of the district; improvement of reliability and provision for comparability of data on economic and social development of the district, that are used by various district management agencies; provision of timely output of necessary information, both on displays and for printout; and provision of a deeper analytical character of statistical documents.

In the future, one should develop a system for integrated processing of accounting and statistical data that provides for compilation of source reports and analytical tables by enterprises and organizations and summary reports and analytical tables for the district directly at the RIVTs, based on the data file which is built up in the process of automating accounting, and on the files of planning data and information, covering past periods. As a result of such integration, there is no more need for enterprises and organizations to compile separate statistical report forms, and reliability of information will improve.

Practical impelementation of integrated processing of accounting data requires the following: correlation of the system of indices, methodology for determination, classification and coding thereof in operational-technical, accounting and statistical reporting; coordination of dates of receiving results accounting information with due dates for presenting statistical reports; matching the hardware of the system for integrated processing of accounting and statistical data with automated processing of traditional statistical report forms; establishing separate flows of reporting and planning information; presenting statistical information, derived at the RIVTs as a result of automated processing of source acounting data, to enterprises (organizations) for approval and confirmation; and stage-by-stage expansion of the integrated system.

Experimental work, conducted in the Valmiera RIVTs, has demonstrated great capabilities and high efficiency of integrated processing of acounting data.

One of the variations of integrated processing is automation of accounting for state purchases of milk and cattle, which calls for informational interaction between the district level ASGS, the dairy plant ASU and the meat packing plant ASU. In this case, local state statistics agencies, state purchasing organizations, and agricultural enterprises receive necessary results information based on the same source accounting data.

The positive experience of the Valmiera RIVTs in automating milk cattle husbandry for collective and State farms of the Valmiera, Limbazh, Tsesis and Valk districts is a testimony to feasibility and efficiency of the use of models of the production functions type (multi-factor regression equations). State statistics RIVTs use models that were developed in a centralized manner for the previous year or averaged over several years, and actual data on production factors and results in the accounting year for each organization. In solving a complex of problems, production potential of each collective and State farm in efficiency of cattle production and cutting the cost of milk is determined, factors are identified that increase or decrease the production potential, the level of its utilization is assessed, and the dynamics of the increase of production potential and of the level of utilization thereof in all organizations is analyzed.

In the agricultural production ASU, attention should be paid to automation of planning calculations of expansion and territorial distribution of agricultural production that is performed on the basis of models and contract-detail projects developed at the Institute of Economics, Latvian SSR Academy of Sciences.

The first stages of the dairy plant ASU and the meat packing plant ASU have been implemented. The meat packing plant ASU includes the following subsystems: standards and references, accounting, operational management of basic production, management of sales, quality control, financial management, ancillary production management, and management of raw materials purchasing. The dairy plant ASU includes the following subsystems: accounting for state purchases of milk, technical and economical planning, operational management of basic production, management of materials and equipment purchasing, management of planning, personnel analysis and registration management, and bookkeeping. Within the framework of the first stages, the share of problems of technical and economical planning and analytical problems is small, whereas forecasting and multi-version optimization problems are not included. It is envisaged to solve the latter during the current Five-Year Plan, when the second stages of the dairy plant ASU and the meat packing plant ASU are developed.

As far as the scope of processed data is concerned, the system of insurance transactions maintenance is considered to be one of the largest systems; within its framework, processing of life insurance data (25 thousand policies) is computerized. It is contemplated to automate other types of insurance using microcomputers.

Within the framework of ASU "Vtorchermet," the following subsystems are identified: scrap purchasing planning, control and acounting, scrap shipments accounting and management, management of scrap processing and sales, payments to scrap suppliers.

Of great interest are such problems as planning of nutrition for the sick, acounting for hihgway construction, assessment of results of socialist competition of district enterprises and organizations, etc.

ABD "Population" (the town of Valmiera) has been implemented. This stores information recorded in an address card of the Republican address bureau (source data on a person at the moment of birth, data on residence, marital status and social category, passport data). Implementation of ABD "Population" over the entire Valmiera district, which is scheduled for 1986, will make it possible to study in an integrated manner population information in the district as a whole and by individual categories, get in a timely manner various groupings, lists (of voters, school students etc.), references, etc. Thirteen demographic tables have been developed.

Some problems are solved for users that are located in other districts of the Valmiera economic region. Among these is, in particular, a complex of problems on analysis of productivity of cows and the cost of milk using methods of mathematical statistics. Accounting for material goods for district Goskomsyelkhoztekhnika associations, insurance transactions for district Inspection of Gosstrakh [State Social Insurance Agency], for the availability and utilization of freight automobile transportation for dispatcher services of the district executive committee, ASU "Vtorchermet" and other accounting operations have been mechanized.

Because the ASOD is being developed as a standard system, tasks implemented at the Valmiera RIVTs are being gradually circulated and used at other RIVTs. A number of problem complexes were used at the Daugavpils RIVTs, on the technical basis of which the first stage of the town and the district of Daugavpils ASOD has been put into industrial operation.

The administrative district ASOD interacts closely with the republican level of ASPR, ASGS and other ASU. From the district to the republican level, data on operational, statistical and accounting reports, drafts of plans, standards for consumption of material resources at enterprises, source accounting and other data are transmitted that are processed in a centralized manner at VTs of Ministries and agencies. In turn, from the republican to the district level, information is transmitted that has been derived as a result of centralized processing, as well as data on approved plans, standard rates data, unified within the republic, a Ministry, or an agency, and unified classifiers.

Analysis demonstrates that the volume of input information processed by the Valmiera RIVTs annually is 317 million characters, and the volume of output information is 1,391 million characters.

In developing the standard ASOD of an administrative district, it is contemplated to pay foremost attention to the developent of the most important subsystems of the territorial system, such as ASOD of local governing agencies, ASPR, ASGS and ASFR [automated system for management of financial calculations] of the district level and ASU RAPO.

The use of microcomputers will make it possible to automate extremely specific problems for district management agencies in a dialog mode. It is envisaged to develop and implement standard design solutions for forming an integrated plan of economic and social development of a district, to automate individual preplanning jobs (compilation of planned balances of labor resources, monetary revenues and expenses etc.), and to develop and implement economic mathematical models for forecasting and planning economic and social development of a region.

Subsystems that have not been included in the second stage of the standard ASU of an administrative district will be further expanded, and new subsystems (ASU of Valmiera Fiber Glass Plant, ASOD of the district department of public education, etc.) will be developed. In order to master procedural, hardware-software, organizational and legal problems of interaction of computer centers, the Valmiera RIVTs will be incorporated into the republican network of computer centers and the republican data transmission system.

Latvian SSR TsSU and Latvian division of NII TsSU SSSR, together with republican Ministries and agencies, have prepared an integrated program for development of the standard ASOD of an administrative district in the 12th Five-Year Plan.

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'ISKRA 2106' AT KUKMORSKAYA RIVS

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[Article by Honored Economist of Tartar ASSR N. Mukhametshin, manager, Kukmorskaya RIVS [district information-computer station], under the "In Local State Statistical Agencies" rubric]

[Text] In 1985, when an "Iskra 2106" microcomputer was received, a genuine opportunity presented itself to considerably increase the level of mechanization of statistical reporting.

At present, 64 out of 90 statistical reports are processed with the help of "Iskra 2106" (annual and occasional statistical jobs have not been mechanized yet).

The main jobs are performed in one day. For the majority of reports, a report is immediately formed, a telegram, based on the report, is wired to the statistical administration and at the same day the economic information is presented to local governing agencies. Due to the limited memory of the computer, certain jobs (for instance, "Report on Cattle Production") are performed in two or more cycles.

What has the microcomputer-aided mechanization of statistical reporting bought? Production efficiency and economic information reliability have improved, the volume of information provided to the district governing agencies has increased by 35%, analytical and control work has deepened. Economists have begun more actively participate along with the RIVS management in setting and controlling reporting discipline.

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APPLICATION OF "ISKRA 2106" MICROCOMPUTER AT DISTRICT LEVEL

Moscow VESTNIK STATISTIKI in Russian No 8, Aug 86 pp 28-30

[Article by E. Semyonova, department head, Ryazanoblmashinform, Statistical Administration, Ryazan oblast, under the "In Local Statistical Agencies" rubric]

[Text] TsSU SSSR [USSR Central Statistical Administration] computer network is being gradually equipped with new computer facilities, "Iskra 2106" microcomputer among them. Following notes report on the experience in its application.

One of the main functions of district information-computer state statistics stations (centers) [RIVS] in Ryazan oblast is collection and processing of statistical data, coming from collective and State farms, enterprises and organizations, located within a district.

When developing a program for "Iskra 2106" microcomputers, which are used for district level state statistical agencies, one had to develop a technology, that would make it possible to acquire necessary data fast and with minimal financial and labor expenditures. Therefore, universality, flexibility and simplicity of operation were mandatory requirements for writing the programs.

As a result, three programs have been developed, application of which makes it possible to derive summary lists, summary-analytical and analytical tables and all types of reports, compiled at a district level.

To derive a summary and summary-analytical lists, one program is used. With this program, 14 parameters of the form are successively entered from all reports; after processing, totals by categories of organizations and for the district as a whole are derived.

The summary list form is a blank 42 x 30 cm fourteen-column form. Its columns are coded by an operator. The same form is used when a summary-analytical list is compiled; four to five copies of the list are made, and, in addition to the reported index code, its text is printed. Names of reporting enterprises in each district are recorded on a magnetic tape and printed automatically. Summary-analytical tables are compiled in 4-SKh [agriculture], 5-SKh, 6-Mekh [mechanization] and other reports.

In the Ryazan oblast, around 50 statistical report forms at the district level are mechanized. The number of tables in individual forms varies from 1 to 30, and each one has to be made in 8-10 copies in exact correspondence to the numbers of lines and columns (with a dash) of the statistical report. This problem was solved with the help of two "flexible" programs (i.e. programs that make it possible to analyze, depending on the demand, the goal and the purpose of various indices in statistical reports or calculate these indices): one program is used for processing data in mail and wire reports on statistics of cattle-breeding, farming agriculture, capital construction, service industry, trade, labor, the other one is used in statistics of state purchases of agricultural products (form 1-R).

The first program provides 17 versions of calculations, but if necessary, one can increase this number to 40, i.e. considerably broaden the number of forms and types of analysis that can be performed.

Program flexibility is ensured by the fact that programs are tied to an arithmetic operation on report indices in a given column of a table, regardless of the text contents of the column.

As in summary lists, names of reporting enterprises in both programs are recorded on a magnetic tape and printed automatically. A necessary prerequisite for the use of the first program is to have blanks of tables, prepared ahead of time, which, in addition to the regular text of analyzed indices, include codes of report line-columns, and, on the left-hand side of the blank (in the title portion of the "Enterprise Name" column), codes of versions of calculations. This is a kind of a prompt for the operator that works not only with statistical reports, but also with planning and other types of documents.

All tables are laid out in the same way: the size is 21 x 30 cm, 6 columns. For each three columns, one version of calculations is provided.

Examples of Versions of Calculations: 1) "Enter", "Enter", column 1 - column 2; 2) "Enter", "Enter", column 4 - column 5; 3) "Enter", "Enter", (column 2/column 1) x 100; 4) "Enter", column 2 - column 4, (column 2/column 4) x 100 etc.

Tables are interleaved with carbon paper (four to five sheets) and two such stacks are placed in a printer, so all 8 to 10 required copies are made at the same time. In this case, RIVS copiers are not used.

The second program for the 1-R form differs from the first one, as it contains seven columns and uses magnetic tape for recording data from the first two stacks and making subsequent copies from the magnetic tape. In this case, the first stack can only have three copies, because the fourth and the fifth ones are not always legible.

Blanks of the 1-R form are made by manual typing, and only the name of a product is typed in.

Data reception from a magnetic tape is also provided for in a special program for deriving a report, form 24-SKh "Report on Status of Cattle-Breeding" with a sufficient number of copies for supplying all collective farms and State farms in a district.

Application of flexible programs with "Iskra 2106" microcomputers makes it possible to derive analytical tables in the shortest possible time. As practice has demonstrated, making 8-10 copies of a table takes no more than 5 minutes.

The tables are checked by comparing totals by categories of farms and for the district with summary lists, planned indices or other data, which is used in this job.

Vertical totals are arrived at by two methods: one for absolute and another one for relative numbers. Figures "1" and "2" next to the calculation version code prompt the operator which method to use. When he or she starts working with a new table, the operator immediately specifies a program for the computer by pressing a number on the keyboard that corresponds to the calculation version number and the method for deriving totals, and thereafter his or her actions consist only of typing in indices in columns (for instance, for the first version, indices in the first and second columns are used, for the second version indices of the fourth and fifth columns are used and so on), and the rest will be done by the computer automatically.

It is feasible to pay statistical administrations for processing sheets of summary lists or analytical tables, rather than reports. This might give RIVS employees an incentive to compile more analytical tables and therefore get more money for this job, whereas in the case of payment for processing of reports, those who perform the entire complex of work are put in the same condition as those who only perform part of it.

Because same size sheets are used for all report forms, there is no need to set prices for each report: it is sufficient to set a price per 42 x 30 cm sheet (in this case, it is possible to establish gradation for districts with the number of reporting farms up to 20 and over 20).

In the end, flexibility of programs and simplicity of application thereof help to improve efficiency of RIVS operators and engineers.

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BRIEFS

NEW SIMULATOR FOR ROBOT/CNC MACHINE TOOL CONTROL--A special microprocessor device, developed by Leningrad scientists and designers, makes it possible for high-school and vocational school students to control a robot or a CNC machine tool from their school desks. The device helps them to acquire computer skills and master fundamentals of programming.

The first industrial batch of these simulators has been manufactured. The electronic "ABC Book" has won a high appraisal from professionals, teachers and has been recommended for widespread application. The mass production of simulators can be mastered by any electronic industry enterprise, and, as the experience has demonstrated, with no additional expenditures at that. [Text] [Minsk NARODNOYE KHOZYAYSTVO BELORUSSII in Russian No 7, Jul 86 p 2] [COPYRIGHT: "Narodnoye khozyaystvo Belorussii", 7, 1986] 12770

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INTRODUCTION OF AUTOMATED DATA PROCESSING SYSTEM

Moscow VESTNIK STATISTIKI in Russian No 6, Jun 86 pp 42-45

[Article by Candidate of Economic Sciences I. Pilipenko, Chief of Statistical Administration, Kiev, and Candidate of Economic Sciences V. Kadiyevskiy, Head of Chair of Economic Cybernetics, Ukrainian Agricultural Academy]

[Text] The Kagarlyk Regional Computing and Data Processing Center (RIVTs), Statistical Administration of Kiev Oblast, has accumulated specific experience in automated data processing of bookkeeping and accounting. Introduction of this system specifically improves the planning of sugarbeet production, provides a proportion of stable relations between individual phases of the production process in agriculture and industry, which synthesize the production of the final product--sugar--in the production process. A total of 12 agricultural enterprises of the region have now been encompassed by integrated data processing of bookkeeping and accounting and automated data processing for accounting for the movements of sugarbeets for the Grigorov and Rakitnyan sugar plants and of the Kagarlyk, Mironov and Uzin sugar combines has been accumulated. The total area of planting sugarbeets in the region comprises 38,330 ha and the volume of production comprises 1.249 million tons.

The automated data processing system for accounting for the movement of sugarbeets using the M5100 control computer has characteristic features, related to the organizational structure and territorial arrangement of raw material suppliers, for enterprises of the food industry. Solution of these problems permits one to determine and eliminate duplication of individual indicators, to improve and reduce the number of documents for accounting for the movement of sugarbeets from suppliers to client (the plant), to bring order to the normative and reference information, to eliminate completely working out the analytical tables manually and to create a database of the system of indicators for accounting for the movement of sugarbeets.

The following primary documents are used in automated processing of documents for accounting for sugarbeets prior to output of the finished product:

3sv-2--reports on overhead for sampling sugarbeets to determine the amount of contamination and sugar content on form NO. 3sv-2;

3sv-1A--covering register (form NO 3sv-1a);

2T(sv)--commercial-transport bill of lading for dispatch (receipt) of sugarbeets (form NO. 2T (sv); a list of the movement of sugarbeets in handling and of writing off sugarbeets at a loss.

The primary documents for accounting for the movement of sugarbeets are processed twice per day at the Regional Computing and Data Processing Center, which permits simultaneous preparation and processing of information for all the indicated enterprises.

Specialists of the bookkeeping and accounting office and of the raw material departments of enterprises maintain visual control over the completeness and directness of filling out the primary documents and also enter additional codes and indicators required for preparation of information on magnetic media.

The software for checking the input information and correction of it has been worked out so that a logic check and completeness of files of input information can be accomplished by computer within the supplier enterprises. This approach permitted a significant increase of the quality of preparation of input data and acceleration of the entire production process.

The input data are prepared at the Regional Computing and Data Processing Center according to specially developed models, the structure of which permits one to obtain intermediate sums by the suppliers of the raw material in separate sugarbeet-growing regions.

All the normative and reference information (NSI) is worked out and constructed on the basis of the tabular method, which permits one to process the data for new sugarbeet enterprises without an additional change of software. The required information for the output hard copy is contained in the normative reference information according to the corresponding client.

Creation of normative and reference information on magnetic tapes and disks eliminates encoding individual indicators of primary documents. Timely automated entry of references for correction of data using the program package, developed at the Regional Computing and Data Processing Center, is required for normal functioning of automated processing of data for accounting for the movement of sugarbeets. The given program package permits one to rewrite and formulate classifiers, to select individual indicators, to correct information (supplementation, restoration, replacement and deletion of individual requisites) and so on. This management of the normative and reference information permits the computer user to receive by request that information which is required during a specific period.

Standardized management of normative reference information contributes to an increase of the level of automation of accounting and computing work and to a reduction of various errors in formulation and coding of primary documents. The Kagarlyk Regional Computing and Data Processing Center has devoted special attention to software development.

The Regional Computing and Data Processing Center issues 12 titles of typewritten reports.

The "Report of incoming sugarbeets" is compiled daily in two copies by each sugarbeet-growing enterprise. Its contents take into account the requisites of commodity-transport invoices with indication of the numbers, the condition of the beets, the "net" weight prior to adjustment, the weight of the adjustment for contamination, the compensation weight and the transport distance. The rates are stated on each invoice and the delivery totals are determined. The data are grouped by kolkhoz machines and by the machines belonging to the motor transport enterprises, which permits the beet consignors to check by the numbers of the commodity-transport invoices whether the beets were accounted for on time and also the correctness of payment for their delivery. The work totals for the day, the cost of the conditioned beets, the total cost of the transported beets, the cost of transport by kolkhoz vehicles and the cost of beets and transport are given at the end of the report.

The typewritten report "Accounting for sugarbeets by kolkhoz sections" is issued daily by each agricultural enterprise with breakdown of brigades and contains data about the amount of total procured beets and in the payment weight for the day and with an increasing total from the beginning of acceptance in quintals. The report is used when posting the bonus payment for the kolkhozes.

The "Report of accounting for the movement of sugarbeets in pits" is issued daily. The movement of beets and of the sugar content in them for each pit is reflected in it from the beginning of acceptance until the end of production. The amount of beets accepted for each pit in payment weight and of the sugar piled in the pit during each day and with an increasing total from the beginning of procurement is posted in the arrival part of the report and the sugar content of the beets upon acceptance is also reflected in it. The amount of beets processed during the day and from the beginning of production and the sugar content are taken into account in the expense part of the report. The remaining beets and the sugar content in them at the end of the day are summarized for each pit. The totals for the day and the losses during the processing are summarized at the end.

The "Report of boom load" is compiled daily for each beet stacker and serves as the main document for accounting for data on the output of the machine operators and of up-to-date summarization of the socialist competition. The amount of beets unloaded during the day and from the beginning of acceptance-- the total and in net weight in quintals--is taken into account in it. The data are also used to calculate the amount of sugar due the machine operators.

The total for the day is summarized at the end of the report.

The "Report of accounting for monetary settlements with the kolkhozes for sugarbeets accepted" is compiled daily by the agricultural enterprises. Two lines are printed for each kolkhoz: 1--the beets turned in during the day, the amount due the kolkhoz for conditioned beets, delivery, early turn-in and increased sugar content, the total amount due, the percent sugar, recalculation, total and date; 2--all indicators of the first line are printed with an increasing total from the beginning of turn-in of beets by the enterprise. This procedure is followed for each agricultural beet-consignor enterprise.

A summary monetary charge is compiled daily according to form for each plant in the profile of the agricultural beet-consignor enterprises for computation for beets received through USSR Gosbank. The typewritten report contains the properties of the sugar plant, of the agricultural enterprises and the date and sum for recomputation.

The "Report on acceptance of sugarbeets," generalized for the plant, is issued daily.

Such indicators as the plan for the season, the percent for fulfillment of the plan, the weight of accepted beets, the physical and payment weight for the day and with an increasing total since the beginning of acceptance, the percent sugar in the accepted beets for the day and with an increasing total and also the percent sugar content and contamination from the beginning of acceptance are reflected in the report for each agricultural beet-consignor enterprise and as a whole for the region.

The report on the acceptance of sugarbeets during the corresponding period is taken as the main report. The amount of received raw beets is verified by it daily and the monetary and real accounts with kolkhozes for beets are also taken into account.

The typerwritten report "Data on arrival of sugar beets by farms of the region" is compiled daily and serves as an up-to-date document on accounting for the work of each agricultural beet-consignor enterprise. The following data are reflected in it for each kolkhoz: the plan and percentage fulfillment, the weight of the turned-in beets and the payment weight, contamination, percentage green mass, the amount taken in during the day and with an increasing total, the amount of turned-in beets in physical and payment weight and the amount of sugar in the raw beets during the day and from the beginning of acceptance. Information is also presented on analyses of the accepted beets for each day since the beginning of acceptance. The report is used by economic organizations for up-to-date verification for turn-in of raw beets by agricultural enterprises.

Five years of operating experience of the Kagarlyk Regional Computing and Data Processing Center for automated data processing of accounting for the movement of sugarbeets up to manufacture of the finished product for the entire region yielded positive results. Thus, approximately ten accounting workers were released during this period, there was no need to recruit additional labor resources to manage the accounting during the mass harvest of sugarbeets, the number of accounting forms was reduced and the timeliness of accounting and computations upon acceptance of the beets and also the quality of accounting and reporting were enhanced, on which depends the efficiency of such functions as analysis, planning, verification and management of fulfillment of the planned tasks. Tables of output forms must be worked out in the future for analysis by individual versions (years), for compiling the results with the initial year, with data of other enterprises, with data by rayon (zone) and so on, which permits one to evaluate the results on a timely basis, to determine deviations and to predict the development of individual indicators. All this is exceptionally important for up-to-date management and future planning.

Introduction of this automated data processing system for accounting for the movement of sugarbeets will make it possible in the Ukrainian SSR alone to recruit more than 400 accounting workers to social production.

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AUTOMATION OF STATISTICAL ACCOUNTING OF RAYON SECTION

Moscow VESTNIK STATISTIKI in Russian No 6, June 86 pp 45-46

[Article by Yu. Shabanov, Chief, V. Kuzikov, Deputy Chief, and Senior Engineer L. Starkova, Novomoskovsk Regional Information Computer Center for State Statistics]

[Text] One of the main sections of modern information computer systems is software (PO). Two directions have now been established in programming the tasks of statistical data processing of the regional section: applications software (PPO) and systems software (SBO).

Applications software is designed for specific tasks of functional subsystems and is executed in the basic systems softawre environment, which is dependent on hardware and on the configuration of computers. The standard operating systems of YeS and SM computers or YaMB-type languages for Iskra electronic bookkeeping machines are used in practice.

The systems software of the rayon unit, with the exception of the basic unit, is in the establishment phase. Applications software is now mainly employed.

Individual applications software was usually created earlier for each form of statistical accounting of the rayon unit. However, improvement of methods of planning and management of the national economy also naturally alters the composition of the statistical indicators, forms and methodology of obtaining output documents. An increase of the production scales, the complexity of economic interfunctions, amplification of the statistical analytical functions, development of the practice of one-time statistical observations and changing the methods of estimating the different economic indicators place increased requirements on the statistics of the rayon unit.

Moreover, introduction of the corresponding changes in earlier developed software is a laborious process and the expenses related to revision are in some cases no less than the expenses for primary development.

Taking all this into account and being guided by generally accepted constraints in development of systems software, the Regional Computing and Data Processing Center worked out a problem-oriented system (POS) for automation of the forms of statistical accounting of the rayon unit from primary documents on the basis of the YeS-1020 computer.

The problem-oriented system permits one to find the output statistical forms as a result of processing the control packets of tables, which include: a description of the cap, the algorithm for the tables and the parameters, constants and totals used in the table.

The developed problem-oriented system has the following functional advantages: simplicity of creating a control package of the form of statistical accounting, POS language, which is as close as possible to the language of the economist, independence of changes of statistical indicators, forms and tables, standardized format of data preparation and computer input, technological effectiveness of industrial exploitation of statistical accounting forms in the given system and lack of constraint of the types of input forms and versions of output tables.

Automation of statistical accounts in the given system essentially reduces to creation of control packages of tables. To do this, the economists of the office of preparation and output of statistical materials, each for the sectors of industry, prepare the input forms and varieties of output tables to the computer operating department. Each table of the form is described in POS language in the computer department, is prepared on an external information carrier and is processed on the computer. The required output tables are obtained as a result of processing the control package. Changes are made if errors are detected and the control package is corrected from them, i.e., the punch cards are changed. After a reliable control package has been obtained, it is cataloged to a magnetic carrier and is subsequently used in industrial operation.

A total of 42 statistical reports (1,200 tables) for the agriculture of the rayon was automated within a short period at the regional computing and data processing center. As a result, the economists of the Office for Preparation and Output of Statistical Materials received balance tables by rayon on each form and summary reports for local management organizations.

The standardized format for data preparation and input to the computer permits one to prepare input data on teletypes directly on the farms of the rayon with subsequent transmission to the computer center. The use of a remote statistical accounting acquisition system permits a reduction in cost and an increase of the up-to-date nature of data processing, an improvement of quality and an increase of the service zone.

Completion of total automation of the statistical accounting forms of the rayon is a transition to execution on the computer of deeper analysis of the activity of enterprises with issuance of specific recommendations. The problem-oriented system is the tool for performing this work.

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STANDARD DESIGN SOLUTIONS FOR INTEGRATED AUTOMATION OF BOOKKEEPING AND ACCOUNTING USING YeS COMPUTERS

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[Article by N. Yegomostyev, Deputy Director, and G. Zhukovskiy, Chief Project Engineer, Belorussian Branch of All-Union Scientific Research and Planning Institute for Accounting, USSR Central Statistical Administration]

[Text] Measures have been implemented during the past few years to improve the organization of bookkeeping and accounting and to centralize, mechanize and partially automate it. Development of a distributed network of computer centers and stations of the USSR Central Statistical Administration system and technical retooling of them will contribute to introduction of more progressive forms and methods of data processing.

The Belorussian Branch of the All-Union Scientific Research and Planning Institute for Accounting, USSR Central Statistical Administration has worked out intersector "Standard design solutions (TPR) for integrated automation of bookkeeping and accounting of the central offices of the institutions existing in the USSR State Budget, using YeS computers," according to the "Program for development of intersector standard design solutions (applications program packages) for automation of bookkeeping and accounting for enterprises (associations) of the sectors of the national economy using the YeS hardware for 1981-1985."

Standard design solutions have been worked out for the standard set of YeS computers and envision the development of unified data accounting and processing technology and for output of the resulting information for the central offices and for the accounting and bookkeeping offices of large individual budget institutions of the educational, health and cultural systems. They are designed for the central offices of budget organizations and institutions attached to rayon, municipal and oblast departments (administrations) of the ispolkoms of Soviets of Working People's Deputies, and also attached to republic and union ministries and departments, which include kindergartens, day-care centers, boarding schools, general education and music schools, special-purpose schools, libraries, Young Pioneer houses, hospitals, polyclinics, therapeutic-health maintenance institutions, infant-feeding centers and other social-cultural institutions.

Standard design solutions can also be implemented in vocational-technical educational schools and also in organizations of the USSR Minvuz [USSR Ministry of Higher Educational Institutions] system with some modification and tie-in to the facility for mechanization.

The totality of bookkeeping and accounting tasks is separated in the standard design solution by functional designation into four complexes (sections) of accounting operations: labor and wages, accounts for special types of payments, food products and material valuables, financial-accounting operations, cash and actual expenses and a synthesized summary account (summary accounting).

Interconnected planning documentation has been worked out for each complex.

Based on the periods of representation and on processing the documentation and on the volumes and flows of input and output information, computation of labor and wages and computation of expenses according to special types of payments and food products are determined for the individual sections. Computation of the named operations is reflected in document forms of the same type. It is not feasible to post corresponding reports for these groups of operations and bookkeeping summaries are formulated by the computer in the profile of institutions according to summary records: for the sums of posted wages and per diem according to types and categories of personnel, for consumption of food products according to consumption operations and by categories of those receiving provisions and by special types of payments--according to types of computations.

Combining the accounting of the basic funds, material reserves, financial computing operations, cash and actual expenses and operations for synthesized free accounting to one complex of problems is determined technologically by the following: documents that reflect operations according to accounting for material valuables and financial computation operations are formulated and arrive for mechanized processing simultaneously; the same primary documents contain records by operations, related to different sections of accounting. Thus, data on the arrival of materials, low-value objects and objects that wear out rapidly, basic funds, packaging and also the total of adjustments and additions and other expenses are reflected in the supplier documents. Records for different synthesized computations related by the correspondence of computations according to the double records method, are also reflected in the advance reports, writeoffs from current accounting and in cash documents. It is essentially feasible and convenient to keypunch them according to a unified model and to formulate them into a single machine file. Accordingly, the description and order of filling in these documents and of transferring information to machine carriers are reflected once in the draft.

Considered by the accounting divisions which comprise the fourth task complex, the information volume is insignificant -- on the average 4-5,000 records, and at a maximum 8-10,000, in other words in this case it doesn't make sense to divide the information into a number of files. The information relationships within a single complex are simplified in this case, since the developed version of punching the records according to the debit and credit of subaccounts reflects interconnected operations. All the operations, related by the corresponding subaccounts, are reflected in the files in the draft within a single complex and thus integrated processing of the data of different sections of accounting work is provided. There is the capability in the unified complex to formulate and print out documents according to standardized forms (by groups of subaccounts of the same kind) and unity of synthesized and analytical accounting is provided. The number of document bundles and of machine files is reduced, the main and peripheral memory are reserved less for the intracomputer information base, the computer memory is distributed more efficiently due to entry and formulation of large volumes of data, the need for magnetic tapes and disks is reduced and in the final analysis expenditures of machine time and the cost of data processing are reduced, which is especially important for budget institutions.

The leading experience of machine processing of individual sections of accounting at the central offices of budget institutions of the educational, health and cultural systems in a number of cities and the experience of integrated mechanization of bookkeeping and accounting on the basis of PVM [not further identified] at the central bookkeeping and accounting offices of the Voroshilov RZO [not further identified] of Moscow, at a number of central bookkeeping and accounting offices at Bobruysk, Sovetsk (Kaliningrad Oblast), Donskoy (Tula Oblast), Brest and Grodno and at the central bookkeeping and accounting offices at Khimki and Minsk on the basis of the M5000 control computer complex was studied when working out the standard design solutions.

The developers of the draft worked out the most efficient standard solutions at the contract design stage, considered the characteristic features for each section, standardized the input data preparation system and the forms of output documents and worked out the design solutions with regard to the composition of the more typical central bookkeeping and accounting offices and of technical and economic indicators. For example, the number of possible institutions in a single bookkeeping and accounting office is essentially unlimited, since this prerequisite is encoded by a three-digit number; the number of groups of participants, departments and of materially responsible persons in a single institution is within the range of 99; up to 10,000 names of material valuables is named for each subaccount; there may be more than 20,000 children and more than 10,000 workers in kindergartens serviced by a single central bookkeeping and accounting office.

The following are provided in the standard design solutions in integrated automation of bookkeeping and accounting: automation of fixing the cost of primary documents for accounting for material valuables. If the total is also posted in the document, in addition to the number and price, then price fixing is checked with issuance of messages in the case of discrepancy of sums. If the price and sum are not posted in the primary documents for the comsumption of material valuables, the average price for the nomenclature number is computed with regard to the remainder and with regard to the arrival during the accounting period and the total expense is determined; computations of the average prices and cost of consumption of food products according to each nomenclature number within the institution and the materially responsible person, the sums of additions for maintenance of children in day-care centers according to constant rates with regard to the number of days they are at the center and for feeding the personnel and also the main types of payment according to established salaries and daily or hourly rates.

Computations of the total allowances for sick leave, the totals for routine and daily leave, pensions for retired workers and some types of bonuses, the total deductions for state taxes and for writs of execution, additional wages during piecework labor for completion of dental and other types of work both with individual and team form of organization and payment, computation and deduction of trade-union dues from wages, computations of fuel and lubricant expenses according to normal mileage of the vehicle, calculation of the total wear according to objects of basic funds and so on are also provided.

Some operations in formulation of data and output of primary documents are mechanized through the use of computers. Thus, receipt notifications, a table of children's attendance record and a table of total working time are printed out, which become input documents after formulation of them at the institutions.

The standard design solution provides integrated data processing in the regulated mode for all sections with issuance of analytical and synthesized accounting reports by subaccounts and with compilation of summary account registers, including the balance of verification of estimated expenses.

A total 30 output documents has been worked out for the first complex of problems, 7 documents have been worked out for the second, 14 documents have been worked out for the third and 24 documents have been worked out for the fourth complex of problems. Memorial writs, compiled by hand, are replaced by machine accounting forms. Depending on the specific features of organization of accounting, one or another forms may generally not be issued at the central bookkeeping and accounting center or may be issued with printout of lines upon request. The request mode makes it possible to issue information for any structural subdivisions or recognized prerequisites (for example, by accounting for material valuables and food products for individual institutions, by materially responsible persons, by nomemclature numbers, by sources of financing, by accounts, subaccounts and suppliers, by accounting for calculations according to special types of payments--by insitutions, types of computations, by groups and by numbers of payment, according to accounting for labor and wages--by institutions, departments, tabular numbers, by types of payments or institutions, by sections, by sources of financing, by categories of personnel, by tabular numbers and by other prerequisites).

Standard design solutions have been worked out with regard to the possibility of introducing them both within the entire complex of bookkeeping and accounting problems and within locally determined complexes and introduction can begin with any of them in this case. All four complexes are informationally connected to each other.

Information for output to each complex can be presented in lists before complete introduction of standard design solutions for the entire bookkeeping and accounting system. Mass bookkeeping summaries in the first three complexes of problems are formulated automatically on the basis of the summary data by institutions using the tables of accounting correspondence, created at the computer centers upon conversion of the central bookkeeping and accounting office to machine processing of data.

Data of all structural subdivisions or with gradual inclusion of data by institutions or individual synthesized accounts can be processed for each of the four complexes of problems.

Applications program packages solve the complex of problems on a single computer from one to several tens of central bookkeeping and accounting offices.

Information for filling in the forms of periodic bookkeeping and statistical reporting and also for economic analysis and planning as, for example, the number of children and patients by institutions, the number of child-days of the stay or the person-day maintenance according to categories of allowances and deviation of the actual cost of feeding from the planned cost according to norms of budget appropriations for one child-day or person-day, distribution of the computed wages by types of payments and categories of personnel, the saving or overrun of budget funds provided in the estimate of the expenses of institutions, consumption of materials for the needs of institutions for determination of above-norm reserves, the presence of individual materials, low-value objects or basic funds according to nomenclature numbers for each materially responsible person, the insitition and for the organization serviced by the central bookkeeping and accounting office as a whole is contained in the output documents for each complex of problems.

It is recommended that primary documents, presented in an "Album of bookkeeping documentation forms for institutions and organizations, compiled at USSR State Budget," be used prior to publication and copying of new forms.

It should be noted that the significant disadvantages which reduce the quality of machine processing of data and the rates of introduction of standard designs are the low quality of formulation of primary documents coming into the central bookkeeping and accounting office (documents of suppliers for operations of movement of food products and material valuables), unsystematic arrival, with long delays, of payment documents to the central bookkeeping and accounting office (thus, the notification receipts for computations for maintenance of children in day-care centers come into the central bookkeeping and accounting office in many cities through the savings banks within 5-7 days). Payment for services during the last few days of the month leads to formal arrears for individual accounts and carry-over of notification receipts to a new month for an incorrect total (which is paid at the end of the month, but the document did not arrive at the central bookkeeping and accounting office during the reporting month). Besides supplier documents, list of incapacitation, documents for piecework, for accounting for child formulas at infant feeding centers and of distribution of them at distribution stations have not been adapted to machine processing at all.

A number of forms of standard primary documents requires modification with introduction or ordering of the arrangement of separate prerequisites to be perforated.

Standard design solutions provide for the use of a classification and coding system, initially worked out for PVM (books 2-5 of classifier, distributed by Izdatelstvo "Finansy i statistika"). Moreover, some codes that permit more complete automation of preliminary arithmetic processing of documents have also been introduced.

The use of unified classifiers permits one to transfer data processing from one type of machine to another without restructuring of the coding system and permits one to provide unity of the methodology and organization of bookkeeping and accounting at budget institutions and at the central bookkeeping and accounting office, different according to departmental affiliation, functional designation and organizational structure.

We also note that the system for preparation of input data for YeS computers is technologically similar to operations of preparing it on punchcard computers. The differences include the fact that the normative reference information when using standard design solutions is created once upon conversion of the central bookkeeping and accounting office to machine processing and is maintained in the form of references on machine stores. There is no need in this regard to post a number of reference, computation and normative data in the primary documents and in arithmetic computations by using keyboard computers.

References of the names of central bookkeeping and accounting offices and of institutions are unified for all complexes of problems. And each complex includes reference manuals that participate in automation of computations, formulation of bookkeeping summaries or printout of the names of food products, material valuables and the surnames of workers or children attending the day-care centers. Up-to-date information is verified according to several references at the stage of introduction and checking (a check for the presence of a given prerequisite in the reference manual).

A total of 24 reference manuals has been created, of which five are common for all the complexes of problems.

A number of reference manuals has been designed for each specific central bookkeeping and accounting office (for example, a reference manual of the names of institutions, personal accounts of workers and subaccounting personnel). The reference manual of the names of food products is unified for all central bookkeeping and accounting offices in the service zone of the computer. Reference manuals of the names of material valuables, corresponding subaccounts, debitors and creditors, balance sheets, categories of those drawing allowances, commodity adjustments and additions by food products can be both individual for each bookkeeping and accounting office and single for several centralized bookkeeping and accounting offices. In this case the computer accesses the code of a specific bookkeeping and accounting office and selects the normative reference information without a general reference if this information is absent.

Check examples for each complex of problems have been worked out in the estimate documentation, which present a small bookkeeping and accounting office with a set of data in different versions according to the volume of information, with different procedures of information input, corrections, requests and forms without output to the "Balance of execution of expense estimation." It is envisioned that work on introduction of standard design solutions at computer centers can be begun only after all output forms for the check example have been received and at central bookkeeping and accounting offices after detailed study of it.

Punchcards, papertapes and magnetic tapes, the information on which is carried in floating or fixed formats, are provided as machine stores of input information. The technical data stores at a specific computer center are selected mainly by the presence and capacity of data preparation units.

A total of thirty-three models for transfer of information to machine stores (perforation models) has been developed for input of online information. Among them are 9 for the primary complex of problems, 6 for the second complex, 7 for the third complex and 11 for the fourth complex of problems. All the models have been standardized by permanent special prerequisites.

The reliability of the entered digital data is verified automatically by the method of comparison of the totals, found upon calculation of each variable prerequisite on the computer according to the document or document bundle, to the totals of the check record. A logic check is made for the presence of alphabet symbols in digital prerequistes, verification for word length is implemented and verification for the presence of the codes of some prerequisites in the references is also implemented.

A visual check on displays is additionally made or other methods of checking are used, besides verification, when preparing information on magnetic tapes.

A check protocol is thus issued with printout of messages about the presence and nature of erroneous records in the document bundle or in the information file or on individual records. The errors are studied by the protocols at the computer center or in the central bookkeeping and accounting office and changes are made if need be to the online information or supplements are entered in the corresponding references. The software has been developed in Assembler language in the operating system (OS), version 6.1.

Approval of the standard design solutions at one central bookkeeping and accounting office was initially planned according to order of Soyuzmashinform [not further identified], USSR Central Statistical Administration. The client and developers subsequently decided to approve standard design solutions at the following computer centers at the basic central bookkeeping and accounting offices for more complete and higher quality verification of the adopted standard design solutions and software: at the Computer Center of Minskoblmashinform , Belorussian SSR Central Statistical Administration--at the central bookkeeping and accounting office attached to the BSSR Ministry of Education, at the central bookkeeping and accounting office attached to the Administration of Culture of Mingorispolkom and at the central bookkeeping and accounting office of the Oktyabr Regional Health Department, Minsk, at the Regional Computer Center of Litmashinform , Lithuanian SSR Central Statistical Administration--at the central bookkeeping and accounting office of kindergartens of the Lenin Regional Department of Public Education and at the central bookkeeping and accounting office of the Lenin Regional Department of Public Education, Vilnius, at the sector computer and data processing center of Tuloblstatmashinform , RSFSR Central Statistical Administration--at the central bookkeeping and accounting office attached to the Sovetskiy Rayisbolkom, Tula, at the regional computer center of Tadzhikmashinform , Tajik SSR Central Statistical Administration--at the central bookkeeping and accounting office of the Central Regional Deparment of Public Education, Dushanbe, and at the Morshansk Regional Computing and Data Processing Center, Statistical Administration, Tambov Oblast, at the Central Bookkeeping and Accounting Office of the Morshansk Municipal Deparment of Public Education.

Approval and experimental operation of standard design solutions has now been completed at the Central Bookkeeping and Accounting Office attached to the BSSR Ministry of Education and at the Central Bookkeeping and Accounting Office attached to the Administration of Culture, Mingorispolkom at the computer center of Minskoblmashinform , BSSR Central Statistical Administration and the given development is functioning in the industrial mode without backup by a manual system. Experimental operation of the standard design solutions is now underway at the other enumerated central bookkeeping and accounting offices, while individual complexes of problems have been turned over for industrial operation.

The system-wide and software documentation for operation and maintenance of standard design solutions and applications program packages for each complex of problems have been turned over to the Intersector Fund of Algorithms and Programs (MOFAP) and will be made available to the user organizations of MOFAP.

If one takes into account that the country's republic and oblast computer centers have been equipped with YeS-type computers and if one takes into account that there are 5-7 central bookkeeping and accounting offices in each large city with large volumes of information, then one can assume that standard design solutions can be operated at approximately 1,000-1,500 central bookkeeping and accounting offices.

The saving due to introduction of standard design solutions at a single central bookkeeping and accounting office comprises approximately 2,500-3,000 rubles annually.

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6521
CSO: 1863/368

UDC: 538.955.681.3

AUTOMATION OF SCIENTIFIC STUDIES IN THE AREA OF EPR OF NON-ORDERED SOLIDS, SPECTRAL RECORDING, PROCESSING AND ANALYSIS SYSTEM

Novosibirsk AVTOMETRIYA in Russian No 2, Feb 86
(manuscript received 6 Jul 84) pp 96-101

[Article by A.N. Bals and L.M. Kuzmina, Riga]

[Abstract] An automated system has been developed for electron paramagnetic resonance studies, oriented toward achievement of structural information from the EPR spectra of nonordered solids. Subsystems of the system are used to automate recording of the EPR spectra, preliminary processing of the spectra and modelling of the spectral form. The automated EPR system was used to develop parameters for the EPR spectra of a number of ions in various nonordered systems, including polycrystals, glass and amorphous thin films. The software is interrupt driven, allowing other users to utilize system resources during measurement of spectra. Figure 1, references 9: 4 Russian, 5 Western.

6508/9835
CSO: 1863/357

UDC: 62.505.532.501

COMPUTER EXPERIMENTAL DETERMINATION OF OPTIMAL INJECTION CONDITIONS FOR AXISYMMETRICAL BODIES

Kiev DOKLADY AKADEMII NAUK UKRAINSKOY SSR. SERIYA A -- FIZIKO-MATEMATICHESKIYE I TEKHNICHESKIYE NAUKI in Russian No 4, Apr 86 (manuscript received 23 Jan 85) pp 66-69

[Article by A.M. Antonov and L.A. Prokopenko, Institute of Cybernetics, Ukrainian Academy of Sciences, Kiev]

[Abstract] The flow structure near the surface of porous bodies with intensive mass transfer has been widely studied, and it has been determined that,

depending on specific gas flow rate, there are three distinct injection conditions: weak, moderate and strong. This article is dedicated to the problem of optimal control of moderate injection. The study is based on a mathematical model describing flow around an axisymmetrical porous body using the method of unconditional minimization, previously tested by the authors in model studies. A direct simulation method is used. Calculation results are compared to data from previous studies in which the bodies around the fluid flowed were assumed nonporous. References 10: Russian.

6508/9835
CSO: 1863/355

UDC: 518.12:621.396

ANALYSIS OF NONSTEADY GAS FLOW PROCESSES IN PIPES USING STEPPED IMAGES

Kiev DOKLADY AKADEMII NAUK UKRAINSKOY SSR. SERIYA A--FIZIKO-MATEMATICHESKIYE I TEKHNICHESKIYE NAUKI in Russian No 4, Apr 86 (manuscript received 23 May 85) pp 79-82

[Article by S.Ye. Saukh, Institute of Problems of Modelling in Power Engineering, Ukrainian Academy of Sciences, Kiev]

[Abstract] A study is made of a nonlinear system of differential equations in partial derivatives, reflecting the laws of conservation of energy, momentum and continuity of a gas stream. Coordinate-by-coordinate transformation of the initial system of equations produces numerical systems whose properties are determined by the averaging parameters. Methods are suggested for selection of the parameters. Algorithms are derived for computer solution of the equations for nonsteady flow of gas in pipes. The algorithms are shown to be highly effective when applied to practical calculations of various sections of actual pipelines. References 3: Russian.

6508/9835
CSO: 1863/355

UDC: 621.378.9:778.4

HOLOGRAPHIC MEASUREMENT SYSTEM FOR DETERMINATION OF PHASE DIFFERENCE FIELD BY INTRODUCING CONTROLLED PHASE SHIFT

Novosibirsk AVTOMETRIYA in Russian No 2, Feb 86 (manuscript received 14 Mar 85) pp 116-118

[Article by V.I. Guzhov, A.G. Kozachok, Ye.G. Loparev, M.G. Orlov and V.V. Chernobrovin, Novosibirsk]

[Abstract] When two wave fronts interfere, a field is produced consisting of a series of bands which contain information on phase. The usual method of interpretation is to determine the centers of bands carrying phase difference information. Known algorithms for locating band centers plus interpolation errors result in errors in determination of phase difference fields. One means of reducing error is to change the phase of one of the fronts by a controlled quantity, yielding a system of 3 independent equations, from which the field of phase differences at each point can be determined. Novosibirsk Electric Engineering Institute has created a measurement system for implementation of this method. The system consists of a holographic interferometer, a device for input and processing of images, a device for introduction of the controlled phase shift and an "Elektronika 60" microcomputer to control the device. The phase shift is introduced by means of a mirror attached to a piezoceramic element. The capabilities of the system were tested by determining the bending ofaa circular membrane rigidly attached around the edges and loaded in the center by a concentrated force. Use of the system allows full automation of interpretation of interferograms in real and holographic interferometry. Figures 2, references 6: 3 Russian, 3 Western.

6508/9835
CSO: 1863/357

UDC 519.612

POLYNOMIALLY STABLE FAST PARALLEL ALGORITHM FOR TRIDIAGONAL SYSTEMS

Moscow ZHURNAL VYCHISLITELNOY MATEMATIKI I MATEMATICHESKOY FIZIKI in Russian
Vol 26, No 7, Jul 86 (manuscript received 25 Jun 84) pp 963-969

[Article by Yu.M. Nechepurenko, Moscow]

[Abstract] A system of linear algebraic equations Mu=f is considered, where M represents a nondegenerate and nonfactorable real square tridiagonal matrix. In accordance with a lemma pertaining to the inverse matrix M^{-1}, this system can be solved in two steps on an SIMD multiprocessor computer. A parallel algorithm of solution faster than any other known one and not only exponentially but also polynomially stable to rounding errors is constructed, on the basis of three other lemmas and two corollaries, starting with exact values and approximate calculations made in binary arithmetic with floating decimal point. The author thanks V.V. Voyevodin for helpful discussion. Tables 1; references 9: 6 Russian, 3 Western (1 in Russian translation).

2415/9835
CSO: 1863/380

UDC 519.854.3

UNIMODULAR PROBLEM OF COUNTABLE PROGRAMMING

Moscow ZHURNAL VYCHISLITELNOY MATEMATIKI I MATEMATICHESKOY FIZIKI in Russian
Vol 26, No 7, Jul 86 (manuscript received 10 Nov 84, after revision 29 Dec 85)
pp 1096-1099

[Article by O.A. Shcherbina, Simferopol]

[Abstract] The problem of couhtable linear programming $\sum_{j=1}^{n} c_j x_j \to \max$ (x_j - integer, j = 1,2,...,n) under the constraints $\sum_{j \in F_i} q_j x_j - b_i$ and $0 \leq x_j \leq 1$ (i = 1,2,...,m) and $F_i = \{j \mid \alpha_j \leq i \leq \beta_j\}$. It can be solved by the

method of branch and bound with some variablesffixed, the matrix of conditions for the problem being a generalized Petrie matrix. From the theorem that the determinant of a square generalized Petrie matrix Q_{nXn} is equal to $\pm \prod_{j=1}^{n} q_j$ or 0, proved by the method of mathematical induction, follow two corollaries: that the elements of matrix Q^{-1}_{nOn} are $\pm 1/q_j$ or 0 when matrix Q_{nOn} is not degenerate and that the Petrie matrix Q_{nXn} is unimodular for $q_j=1$. The programming problem can therefore be solved as a linear one by the simplex method, without rounding errors in division which require recalculation of the inverse matrix, using a local algorithm as demonstrated onaa computer experiment. The author thanks Yu.I. Zhuravlev for interest. Tables 1; references 3: 2 Russian, 1 Western.

2415/9835
CSO: 1863/380

UDC 519.62

ALGORITHM OF SOLUTION OF NONLINEAR BOUNDARY-VALUE PROBLEM FOR ORDINARY DIFFERENTIAL EQUATIONS IN MULTIVALUEDNESS REGION

Moscow ZHURNAL VYCHISLITELNOY MATEMATIKI I MATEMATICHESKOY FIZIKI in Russian Vol 26, No 7, Jul 86 (manuscript received 23 Nov 84) pp 1099-1102

[Article by A.S. Belomyttsev and V.I. Karaban, Kharkov]

[Abstract] The method of continuation is applied to solution of nonlinear boundary-value problems for ordinary differential equations which describe the dependence of several parameters in the solution on one independent parameter. Continuation is done by iterative solution for discrete values of that parameter, the strategy of passing through singular points being selected so as to avoid the need for solving a system of linear differential equations with a singular matrix. The procedure is demonstrated on the two-point original problem $\dot{y}=f(t,y)$ $(0\le t\le T)$ and $\phi(y_0,y_T)=0$, where $y:[0,T]\to R^n$, $f:[0,T]xR^n\to R^n$, $\phi:R^n xR^n\to R^n$, $y_0=y(0)$, $y_T=y(T)$. The corresponding Cauchy problem $\dot{x}=f(t,x)$ $(0\le t\le T)$ and $x(0)=c$ is assumed to have a unique solution for any $c\in R^n$. The original problem is to be solved not for one given value of T but for $T\in[a,b]$, which means that the dependence $y_0=y_0(T)$ is sought. A sufficiently large number of $y_0(T)$ points found will be assumed to constitute the solution. The algorithm which has been programmed for solving on a YeS-1033 computer is the periodic boundary-value problem with $\dot{y}_1=y_2$ and $\dot{y}_2=-f(y_1)-ay_2+b\cdot\sin(2\pi t/T)$, with $y_1(0)=y_1(T)$ and $y_2(0)=y_2(T)$, where $f(y_1)$ is a piecewise-linear function: $f(y_1)=cy_1$ for $y_1>-m/c$, $f(y_1)=-m$ for $-d-m/c\le y_1\le -m/c$, $f(y_1)=c(y_1+d)$ for $y_1<-d-m/c$. The problem has been solved for a=37.594, b=2,443.6, c=2,706,800, m=3,759.4, d=0.015 and with these parameters found to have five solutions within the $2\pi/T= =[930,1110]$ frequency range. Figures 2; references 6: 5 Russian, 1 Western (in Russian translation).

2415/9835
CSO: 1863/380

UDC: 612.2

MODELLING OF ONE CLASS OF NONLINEAR SELF-ORGANIZING SYSTEMS

Kiev DOKLADY AKADEMII NAUK UKRAINSKOY SSR, SERIYA A -- FIZIKO-MATEMATICHESKIYE I TEKHNICHESKIYE NAUKI in Russian No 4, Apr 86 (manuscript received 5 Nov 85) pp 76-79

[Article by B.N. Pshenichniy, Corresponding Member, Ukrainian Academy of Sciences, Yu.N. Onopchuk and K.B. Polinkevich, Institute of Cybernetics, Ukrainian Academy of Sciences, Kiev]

[Abstract] Equations are presented for the technological or biological process of delivery and utilization of a substance which is produced in various areas within a system, delivered to other areas within the system by forced convection in a fluid, in which the substance is either dissolved, or mixed, chemically bonded with other substances. The properties of solutions of the equations are studied. References 6: Russian.

6508/9835
CSO: 1863/355

UDC: 62-50+519.8

CONTROL UNDER CONDITIONS OF INDIFFERENT UNCERTAINTY

Kiev DOKLADY AKADEMII NAUK UKRAINSKOY SSR. SERIYA A -- FIZIKO-MATEMATICHESKIYE I TEKHNICHESKIYE NAUKI in Russian No 4, Apr 86 (manuscript received 17 May 85) pp 73-76

[Article by V.A. Labkovskiy, Institute of Cybernetics, Ukrainian Academy of Sciences, Kiev]

[Abstract] The two best known problems of control under conditions of uncertainty, Stochastic uncertainty and complete uncertainty, are formulated. It is immediately seen that the situations described by the two problems differ in two senses: by the degree of information concerning the behavior of the unknown parameter and the goals set before the controller. In stochastic uncertainty an attempt is made to reduce the mean losses, in complete uncertainty--the maximum losses. A study is made in this article to see whether there is a relationship between these two differences or whether it is possible in the case where the distribution of the unknown parameter is known to control maximum losses, and when nothing is known about the parameter to control the mean losses. References 4: Russian.

6508/9835
CSO: 1863/355

UDC: 519.21

CONSTRUCTION OF AN ANALYTIC-STATISTICAL ESTIMATE FOR THE NONSTEADY READINESS FACTOR OF SYSTEMS

Kiev DOKLADY AKADEMII NAUK UKRAINSKOY SSR. SERIYA A -- FIZIKO-MATEMATICHESKIYE I TEKHNICHESKIYE NAUKI in Russian No 4, Apr 86 (manuscript received 29 May 85) pp 70-72

[Article by V.G. Krivutsa, Institute of Cybernetics, Ukrainian Academy of Sciences, Kiev]

[Abstract] The method of statistical testing allows computation of probability characteristics of systems for which analytic methods are not applicable. Previous studies have developed a general approach allowing an increase in the effectiveness ofthe method of statistical testing. This article continues this approach, suggesting a method of constructing an analytic-statistical estimate for the nonsteady system readiness factor, assuming high system reliability. The work is based on a general system model described by univariate piecewise-linear aggregates. References 6: Russian.

6508/9835
CSO: 1863/355

UDC: 681.322.621.391.28

OPTIMIZATION OF THE STRUCTURE OF RING DATA TRANSMISSION NETWORKS

Riga AVTOMATIKA I VYCHISLITELNAYA TEKHNIKA in Russian No 2, Feb 86
(manuscript received 5 Apr 85 {29 Jan 85}) pp 11-18

[Article by G.F. Yanbykh]

[Abstract] A study is made of the process of optimizing the structure of ring data transmission networks. The first section of the article states the problem of selecting a ring data transmission network structure in terms of integer mathematical programming. Section 2 describes an algorithm for constructing all possible loops consisting of communication channels connecting terminal systems with other terminals or the computers, including each terminal or computer in a loop just once. Section 3 describes the method of representing all possible loops as sets of points on a graph in which the connecting lines connect points with no common terminal sets. The problem is to find the optimal structure in terms of minimum cost for leasing or laying communications channels such that each terminal is included in one and only one loop of the subset. Examples of Soviet ring structure networks include the Aeroflot airline ticket sale and reservation network. The use of precise methods for selecting the structure of such large ring networks can provide a significant savings. Figures 4, references 11: 10 Russian, 1 Western.

6508/9835
CSO: 1863/361

UDC: 681.3

THREE PROBLEMS OF DECENTRALIZED FUNCTIONING OF RING ARCHITECTURE MICROPROCESSOR SYSTEMS

Moscow PROGRAMMIROVANIYE in Russian No 2, Mar-Apr 86
(manuscript received 17 May 85) pp 76-86

[Article by I.Z. Nafikov and R.M. Nuriev]

[Abstract] A study is made of decentralized algorithms for the performance of 3 tasks arising in local area networks and multimicroprocessor ring-structure MIND type systems: parallel sorting of a data set distributed among system modules; equalization of a number of elements in subsets of a certain set located in different system modules; and analysis of the cartesian product of distributed sets in a given sequence. A general method is presented for proof of estimates of complexity of the algorithms. It is assumed that connections between the modules are local, such that interaction between any pair of neighboring modules does not hinder interaction in other modules on the network. The decentralized algorithms suggested are local in the sense that they define individual data processing rules for interacting modules. Availability of information on the status or results of operation of other modules is not assumed. In all three tasks, the maximum number of pairs of modules is assumed to interact in each step. Figures 3, references 6: 5 Russian, 1 Western.

6508/9835
CSO: 1863/360

UDC: 681.3-192:681.3.066

ANALYSIS OF THE MUTUAL INFLUENCE OF LOCAL COMPUTER NETWORK SOFTWARE AND HARDWARE DURING DEBUGGING

Riga AVTOMATIKA I VYCHISLITELNAYA TEKHNIKA in Russian No 2, Feb 86
(manuscript received 30 May 85 {22 Jan 85}) pp 38-44

[Article by B.P. Gorelik]

[Abstract] Since debugging represents 90% of the cost of the development of complex computer software and hardware systems, a comprehensive study of the process of debugging digital control systems based on local area networks in order to develop methods and means for effective organization process is a very important task. The interaction of software and hardware during the debugging process in digital control systems can be described by a mathematical model of interrelationships among these components. This article undertakes the formulation of such a model. As an example, the construction of a mathematical model of the interrelationships involved in debugging without software and hardware is studied for a 4-machine digital

control system with a total instruction memory volume of 128K, CPU speed 150,000 operations per second and number of circuits 200,000. The regression model constructed from this example can be used to plan the process of debugging of new digital control systems in this same class. Figures 3, references 8: Russian.

6508/9835
CSO: 1863/361

UDC: 681.324

LOCAL DATA TRANSMISSION NETWORK OF DISTRIBUTED CONTROL SYSTEMS

Riga AVTOMATIKA I VYCHISLITELNAYA TEKHNIKA in Russian No 2, Feb 86 (manuscript received 17 Apr 85 {9 Oct 84}) pp 45-50

[Article by Yu.I. Bain and R.A. Paluoya]

[Abstract] The specifics of local networks in distributed control systems are discussed and the design of the SATNET at the Institute of Cybernetics, Estonian Academy of Sciences is described. The functional architecture of SATNET consists of a set of protocol processes at 4 levels which interact at stations using a "supplier-consumer" principle with synchronization by semaphores utilizing the interrupt system of the MOS RV operating system, a derivative of RMX-80. The topology of the network and design of thee priority system are briefly discussed. Characteristics of SATNET are as follows: twisted pair network broadcasting nonmodulated signals in the base band, maximum physical line length 10 km, 2 km between repeaters, maximum number of stations 31, 2K protocol and buffer memory, maximum frame length 32 octets, time of conflict resolution not over $7.5 \cdot 10^{-3}$s, group 1 message delivery time, highest priority, not over $50 \cdot 10^{-3}$s, physical transmission speed 9600 baud. References 9: 5 Russian, 4 Western.

6508/9835
CSO: 1863/361

AUTOMATION OF THE EsSSR STATE LIBRARY DESCRIBED

Tallinn SOVETSKAYA ESTONIYA in Russian 12 Jun 86 p 4

[Article by A. Agarkov, Estonian Telegraph Agency: "On a First-Name Basis with the Computer"]

[Text] Informatics and computer-science specialist certificates have been presented to graduates of the skills-improvement department of the same name at the Tallinn Polytechnical Institute. This is the first such department in Estonia. In practice it has already become an intersectorial department, since hundreds of engineers, technicians and other workers from all sectors of the economy acquire theoretical and practical skills in computer and microprocessor technology, while continuing in their jobs.

"We fully support the proposal contained in the published draft of the CPSU Central Committee regarding the Principle directions for reorganizing higher and secondary special education, which states the necessity of creating VUZ courses in which it would be possible to acquire new knowledge according to a specific program, in particular, abilities and skills in mastering computer science," M. Reyal', chief engineer of the State Library of the EsSSR im. F. R. Kreytsval'd, emphasized in an interview with a correspondent from the Estonian Telegraph agency. "And the university, as noted in the Party document, is at the center of the unified system for continuous skills improvement."

"We have now begun in real earnest to develop an automated library information system which will completely alter library technology by 1990, when the library will be moved to a new building. The personnel must by this time be "on a first-name basis" with the computer, since displays will replace the usual catalogs. The librarian will now have an automated work station with a personal minicomputer. Our bibliographers, editors and librarians who will be working directly with the electronics are among the first graduates of the new Tallinn Polytechnical Institute department. Management is also sitting behind the desk (or more accurately, the display), since today no confident manager can dispense with knowledge of modern managemental methods."

12678
CSO: 1863/369

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